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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/811,081	03/16/2001	Thomas Mossberg	LTSM01NP	6284

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DAVID S ALAVI
3762 WEST 11TH AVENUE
#408
EUGENE, OR 97402

EXAMINER
AMARI, ALESSANDRO V

ART UNIT	PAPER NUMBER
2872	

DATE MAILED: 08/05/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/811,081	MOSSBERG, THOMAS	
	Examiner	Art Unit	
	Alessandro V. Amari	2872	

-- The MAILING DATE of this communication app ars on the cover sh t with th correspond nce address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 May 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-16,18-54 and 87-136* is/are pending in the application.

4a) Of the above claim(s) *1-11,26-33,36-44 and 56-105* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *12-16,18-25,34,35,45-54 and 106-136* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *13* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 106, 107, 111, 112, 116, 117, 122, 123, 135 and 136 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Regarding claims 106, 107, 111, 112, 116, 117, 122, 123, 135 and 136, the recitation that each portion of the second or output temporal waveform includes contributions from a plurality of portions of the first spatial wavefront or that each portion of the second or output spatial wavefront contributes to a plurality of portions of the second or output temporal waveform has not been described in the specification. As such, this recitation constitutes new matter.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 12-13, 16, 18, 19, 23, 24, 34, 35, 45-54, 106, 107, 111, 112, 116, 117 and 134-136 are rejected under 35 U.S.C. 102(b) as being anticipated by George et al U.S. Patent 4,834,474.

In regard to claims 12, 34, 45 and 134, George et al teaches (see Figures 1b, 2b and 4b) an optical apparatus comprising a volume hologram including a plurality of diffractive elements (12) exhibiting a positional variation in at least one of amplitude, optical separation, and spatial phase over some portion of the volume of the hologram interacting with an input optical signal having a first spatial wavefront and a first temporal waveform to produce an output optical signal having a second spatial wavefront and a second temporal waveform, wherein the first and second spatial wavefronts differ in at least one of spatial wavefront shape and output direction, and the first temporal waveform differs from the second temporal waveform or a plurality of output optical signals, each output optical signal having a spatial wavefront that differs from the respective spatial wavefronts of all other output optical signals, each output optical signal having a respective temporal waveform, wherein at least two of the output optical signals have temporal waveforms that differ from one another; and a plurality of output ports configured to accept and transmit the plurality of output optical pulses as described in column 2, lines 47-65 and column 5, lines 22-41.

Regarding claims 13, 35 and 49, George et al teaches that the input optical signal comprises an optical pulse as described in the abstract and column 5, lines 22-41.

Regarding claims 16 and 54, George et al teaches the volume hologram is an optical waveform cross-correlator as described in column 2, lines 47-65 and column 5, lines 22-41.

Regarding claim 18, George et al teaches that each of the diffractive elements has a spherical contour and a center of curvature as shown in Figures 1b, 2b and 4b.

Regarding claim 19, George et al teaches that the centers of curvature of a plurality of the diffractive elements are coincident as shown in Figures 1b, 2b and 4b.

Regarding claim 23, George et al teaches that the propagation direction of the input optical signal is not collinear to the propagation direction of the output optical signal as shown in Figures 1b, 2b and 4b.

Regarding claim 24, George et al teaches all diffractive elements have an elliptical contour, with each diffractive element having a first focus and a second focus, and wherein a plurality of the respective first foci of the diffractive elements coincide, and a plurality of the respective second foci of the diffractive elements coincide as shown in Figures 1b, 2b and 4b.

Regarding claims 46 and 47, George et al teaches that the volume hologram further comprises spatial transformation information and the diffracted optical signal is spatially transformed as described in column 5, lines 22-41.

Regarding claim 48, George et al teaches that the input optical signal has a first direction of propagation and the diffracted optical signal has a second direction of propagation, and where the first direction of propagation is not collinear to the second direction of propagation as shown in Figures 1b, 2b and 4b.

Regarding claims 50, 51, 52 and 53, George et al teaches that the volume hologram further comprises spectral and spatial transformation information and the diffracted optical signal is spectrally and spatially transformed as described in column 7, lines 52-67.

Regarding claims 106, 111, 116 and 135, George et al teaches that each portion of the second or output temporal waveform includes contributions from a plurality of portions of the first spatial wavefront as shown in Figures 1a and 1b and as described in column 5, lines 22-41.

Regarding claims 107, 112, 117 and 136, George et al teaches that each portion of the second or output spatial wavefront includes contributions from a plurality of portions of the second or output temporal waveform as shown in Figures 1a and 1b and as described in column 5, lines 22-41.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 14, 15, 20, 25, 108-110, 113-115, 118-120, and 121-133 are rejected under 35 U.S.C. 103(a) as being unpatentable over George et al U.S. Patent 4,834,474 in view of Weverka U.S.Patent 5,165,104.

Regarding claims 14, 15, 20, 25, 108-110, 113-115, 118-120 and 121-133, George et al teaches the invention as set forth above, and in regard to claim 20, George

et al teaches that the respective input and output located at respective conjugate image points of the plurality of the diffractive elements whose centers of curvature are coincident as described in column 6, lines 30-55 and column 10, lines 17-27 and as shown in Figure 4b. The conjugate image points are broadly interpreted as being two sources which are equally well imaged at two different points as for example, the points shown in Figure 4b (incident pulse and diffracted pulse). Since the incident pulse and the diffracted pulse are equally well imaged accordingly the two are interpreted as respective conjugate image points. In regard to claim 121, George et al teaches (see Figures 1b, 2b and 4b) an optical apparatus comprising a volume hologram comprising a plurality of diffractive elements (12) exhibiting a positional variation in at least one of amplitude, optical separation, and spatial phase over some portion of the volume of the hologram interacting with an input optical signal having a first spatial wavefront and a first temporal waveform to produce an output optical signal having a second spatial wavefront and a second temporal waveform, to produce an output optical signal having a second spatial wavefront and a second temporal waveform, the first and second spatial wavefronts differing in at least one of spatial wavefront shape and output direction, the first temporal waveform differing from the second temporal waveform as described in column 2, lines 47-65 and column 5, lines 22-41. Regarding claim 122, George et al teaches that each portion of the second temporal waveform includes contributions from a plurality of portions of the first spatial wavefront as shown in Figures 1a and 1b and as described in column 5, lines 22-41. Regarding claim 123, George et al teaches that each portion of the second or output spatial wavefront

includes contributions from a plurality of portions of the second or output temporal waveform as shown in Figures 1a and 1b and as described in column 5, lines 22-41. Regarding claim 124, George et al teaches that the input optical signal comprises an optical pulse as described in the abstract and column 5, lines 22-41. Regarding claim 127, George et al teaches the volume hologram is an optical waveform cross-correlator as described in column 2, lines 47-65 and column 5, lines 22-41. Regarding claim 128, George et al teaches that each of the diffractive elements has a substantially circular contour and a center of curvature as shown in Figures 1b, 2b and 4b. Regarding claim 129, George et al teaches that the centers of curvature of a plurality of the diffractive elements are coincident as shown in Figures 1b, 2b and 4b. Regarding claim 131, George et al teaches that the propagation direction of the input optical signal is not collinear to the propagation direction of the output optical signal as shown in Figures 1b, 2b and 4b. Regarding claim 132, George et al teaches all diffractive elements have an elliptical contour, with each diffractive element having a first focus and a second focus, and wherein a plurality of the respective first foci of the diffractive elements coincide, and a plurality of the respective second foci of the diffractive elements coincide as shown in Figures 1b, 2b and 4b.

However, George et al does not teach that the second spatial wavefront converges to an output optical waveguide or that the input optical signal originates from an input waveguide, and wherein the output signal converges to an output waveguide or the volume hologram residing within a planar optical waveguide, the input optical signal interacting with the volume hologram while propagating within the planar waveguide,

each of the input port and the plurality of output ports being positioned at the edge of the planar waveguide, the input optical waveguide being a channel waveguide and the output optical waveguide being a channel waveguide.

Regarding claims 14, 15, 20, 25, 108-110, 113, 114, 115, 118-120, 125, 126, 130 and 133, Weverka does teach (see Figure 1) that the second spatial wavefront converges to an output optical waveguide (33, 35, 37) and that the input optical signal originates from an input waveguide (25, 27, 29) and wherein the output signal converges to an output waveguide and the volume hologram residing within a planar optical waveguide as described in column 3, lines 48-61, the input optical signal interacting with the volume hologram while propagating within the planar waveguide, each of the input port and the plurality of output ports being positioned at the edge of the planar waveguide, the input optical waveguide being a channel waveguide and the output optical waveguide being a channel waveguide as described in column 5, lines 58-68 and column 6, lines 1-10.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the planar waveguide form factor as taught by Weverka for the optical apparatus of George et al in order to produce a modular apparatus which can be networked and reduces optical losses so as to provide for an improved optical interconnection.

7. Claims 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over George et al U.S. Patent 4,834,474 in view of Weverka U.S.Patent 5,165,104.

Regarding claims 21 and 22, George et al teaches the invention as set forth above but does not teach that the first spatial wavefront originates from an input optical waveguide and the second spatial wavefront converges to an output optical waveguide.

Regarding claims 21 and 22, Weverka does teach (see Figure 1) that the first spatial wavefront originates from an input optical waveguide (25, 27, 29) and the second spatial wavefront converges to an output optical waveguide (33, 35, 37).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the planar waveguide form factor as taught by Weverka for the optical apparatus of George et al in order to produce a modular apparatus which can be networked and reduces optical losses so as to provide for an improved optical interconnection.

Furthermore, regarding claims 21 and 22, George et al also does not teach that the input waveguide is separated from the output waveguide by a distance equal to or less than about 5000 microns or that the input waveguide is separated from the output waveguide by a distance between about 5000 microns and about 25 microns.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to separate the input and output waveguides by the micron ranges claimed, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. One would have been motivated to fix the separation distances for the purpose of focusing the input and output waveforms on the waveguides. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235.

Response to Arguments

8. Applicant's arguments filed 15 May 2003 have been fully considered but they are not persuasive.

The Applicant argues that he has acted as his own lexicographer and set forth a definition for the term "volume hologram" in the specification and that the prior art, George et al does not meet the definition of a volume hologram as set forth in the specification. Specifically, the applicant contends that the diffractive structure of George et al has no retardation effects within the structure significantly influencing the form of the output signal.

In response to this argument, the Examiner would direct the Applicant's attention to column 5, lines 36-39 in George et al which states:

> "curves introduced into the holographic element **12** are mapped into spatially varying temporal delays in the diffracted pulse"

and column 7, lines 56-61 in George et al which states:

> "Again *element curvatures are used to impart* programmable spatially-varying temporal delays in the incident pulse. A feature of this delay line is the variability in spectral and angular bandwidth which may be *imparted by the fringe pattern of the volume holographic element structure*" (italics Examiner)

From these two passages, it is clear that the diffractive structure of George et al has retardation effects **within the structure** (i.e., element curvatures and fringe patterns) which influence the form of the output signal and so meets the definition set forth in the specification. This feature is further described in George et al in column 3, lines 1-29

which describes a wavefront of an input signal which propagates through a volume containing interference fringes and which imparts any desired space-time characteristic to an output signal. The Examiner would further note that limitations appearing in the specification but not recited in the claim are not read into the claim. The applicant is encouraged to amend the claim to better reflect what applicant intends to claim as the invention.

The Applicant further argues that George et al does not teach the use of optical waveguides or other limitations recited in claims 14 and 15.

In response to this argument, the Examiner has provided a new 103 rejection (George et al in view of Weverka) to address this issue.

The Applicant further argues that George et al does not teach or meet the description of an optical waveform cross-correlator.

In response to this argument, the Examiner maintains that the recitation that the volume hologram is an optical waveform cross correlator is an inherent teaching of this device. This is because in a volume hologram two inputs (object beam, reference beam) are cross-correlated to each other that is, the interference fringes of the volume hologram have to be defined by cross-correlation of the two beams.

The Applicant further argues that George is silent as to the shape of the diffractive element contours, other than to disclose sets of parallel straight lines.

In response to this argument, the Examiner directs the Applicant's attention to column 5, lines 36-39 in George et al which states:

"curves introduced into the holographic element **12** are mapped into spatially varying temporal delays in the diffracted pulse";

and column 7, lines 56-61 in George et al which states:

"Again *element curvatures are used to impart* programmable spatially-varying temporal delays in the incident pulse.

and further in column 3, lines 26-29

"By varying the shape of the volume holographic gratings, nearly any desired space-time characteristics may be obtained" (italics Examiner)

So, clearly, George et al does teach the shape of the diffractive element contours.

The Applicant further argues that George does not disclose that each portion of the output temporal waveform or output optical spectrum includes contributions from a plurality of portions of the first spatial wavefront or that each portion of the output spatial wavefront contributes to a plurality of portions of the output temporal waveform or output optical spectrum. Furthermore, the Applicant asserts that the claimed limitations are inherent.

In response to this argument, the Examiner has invoked a 112 first paragraph rejection since the limitations recited are not described in the specification or drawings despite the Applicant's assertion that the limitations are inherent. The Applicant needs to define the term "contributions from a plurality of portions" and where this term or its effect is described in the specification. As such, the prior art, George et al meets the claimed limitation as described in column 2, lines 47-65 and column 5, lines 22-41.

The Applicant further argues that George does not disclose a volume hologram residing within a planar optical waveguide or the interaction or propagation of the input optical signal within the planar waveguide.

In response to this argument, the Examiner has provided a new 103 rejection (George et al in view of Weverka) to address this issue.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alessandro V. Amari whose telephone number is (703) 306-0533. The examiner can normally be reached on Monday-Friday 8:00 AM to 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on (703) 305-0024. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

ava
July 23, 2003

MARK A. ROBINSON
PRIMARY EXAMINER